



Street smart

By Nancy Salem

In a partnership almost as old as technology transfer itself, Sandia Labs and Goodyear Tire & Rubber Company have worked together for 25 years to create better vehicle tires, more advanced computational mechanics, and keep Goodyear competitive in a tough business environment. “You might wonder how national defense systems and nuclear stockpile management relate to tire science,” says Mary Monson, senior manager of Technology Partnerships Dept. 1180.

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HISTORIC PARTNERSHIP — Sandia Labs and Goodyear Tire & Rubber Company have worked together a quarter century to advance tire science along with computer modeling and simulation. In this 1997 photo Sandia researchers, clockwise from bottom left, Roger Assink, Mike Malone, Gary Jones, and Ken Gillen, all now retired, discuss samples in a project that looked at how tires age. The Cooperative Research and Development Agreement between Sandia and Goodyear has been renewed repeatedly since 1993 and Goodyear continues to produce innovative products developed in collaboration with the Labs. “So many good things have come out of this enduring partnership,” says Mary Monson, senior manager of Technology Partnerships Dept. 1180. “It has worked both ways. We were able to apply our codes to a real-world problem, and improve our codes. And Goodyear was able to develop revolutionary products.” (Photo by Randy Montoya)



Tires and national security might not seem to have a lot in common. But for 25 years, Goodyear and Sandia Labs have worked together and raised each other’s game.



JUSTINE JOHANNES



CAROL ADKINS



ESTHER HERNANDEZ

‘Women Worth Watching’

Three Sandia women honored by Profiles in Diversity Journal

SEE PAGE 9

A scintillating discovery

Bright thinking leads to breakthrough in nuclear threat detection science

By Jules Bernstein

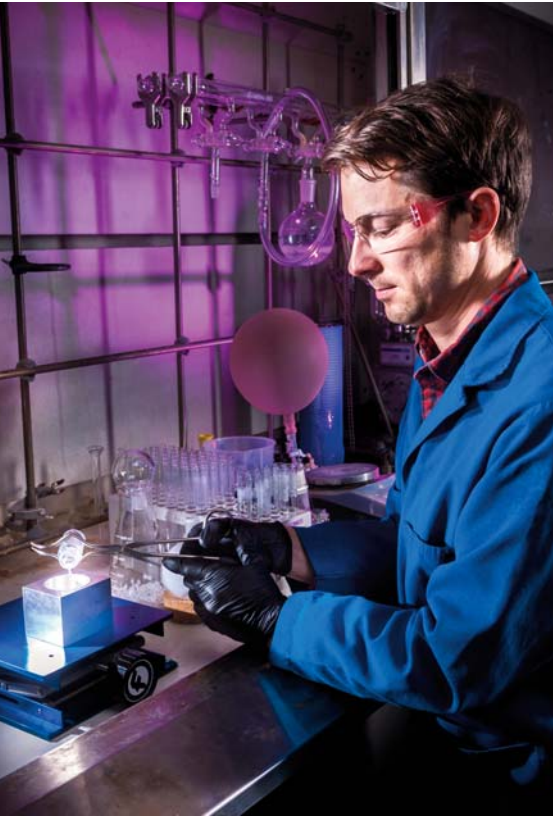
Taking inspiration from an unusual source, a Sandia team has dramatically improved the science of scintillators — objects that detect nuclear threats. According to the team, using organic glass scintillators could soon make it even harder to smuggle nuclear materials through America’s ports and borders.

The Sandia Labs team developed a scintillator made of an organic glass that is more effective than the best-known nuclear threat detection material, while being

(Continued on page 5)

SANDIA RESEARCHER JOEY CARLSON demonstrates the ease of casting an organic glass scintillator, which takes only a few minutes as compared to growing a trans-stilbene crystal, which can take several months.

(Photo by Randy Wong)




BRING IT ON


Research Challenges throw down the gauntlet

BOLD IDEAS to excite, inspire research community.

Story on pages 6-7



SF-BREEZE looks at using hydrogen fuel-cell powered passenger ferries for environment, efficiency. 3



GIVING BACK at Ronald McDonald House 2

Safeguards & Security Center wins quality award

MALCOLM BALDRIGE National Quality Award

LEVEL 4: EXCELLENCE Zia Award

LEVEL 3: PROGRESS Roadrunner Recognition

LEVEL 2: COMMITMENT Pifion Recognition

LEVEL 1: FUNDAMENTALS

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That’s that

As June winds down, we’ve just observed two big birthdays: Harry Potter – the boy who lived – turned 20 on June 26 and the Apple iPhone – the phone that lives on and on – turned 10 on June 29. Both seem to me to have been with us forever.

Both “birthdays” are a bit misleading. Author J.K. Rowling tells us Harry’s birthday is “actually” July 31, the same as hers. June 26, 1997, marked the day the first book, *Harry Potter and the Philosopher’s Stone*, was launched in the UK. It was the first in a series of books that became the publishing phenomenon of the century, made Harry Potter and friends as familiar to us as our next of kin, and made Rowling a billionaire.

Regarding the iPhone anniversary, yes, it went on sale on June 29, 2007, but Apple CEO Steve Jobs introduced the device on Jan. 9 to literal whoops and hollers from an audience of Apple true believers at the 2007 MacWorld expo. “Today, Apple is going to reinvent the phone,” he said. And it did.

That was the thing about Steve Jobs and Apple. Jobs was a consummate showman – watch the video of that iPhone rollout to remind yourself of just how good he was – and he was given to making extravagant claims about his company’s products. But then he delivered. And when you deliver, you can get away with a lot of hyperbole. As baseball Hall of Fame pitcher Dizzy Dean once said (in a quote often attributed to heavyweight champion Muhammad Ali), “It ain’t braggin’ if you can back it up.”

Harry Potter and iPhone: Two culture-rattling creations from two different worlds – the world of arts and letters and the world of science and engineering.

Though on first glance they would seem to have little to do with each other, Harry and the iPhone have one big thing common. Both are expressions of creativity so fresh and so compelling that they both grabbed and held the attention of the entire world. What I find interesting in thinking about these two phenomena is how critically they depend on each other for their extraordinary success.

Let me be clear: I don’t mean that Harry Potter depended *specifically* on the iPhone or that the iPhone depended on Harry Potter *specifically* for their success. But to become the global phenomenon it was, the Potter series required that there be in place a world-wide publishing capability built on cutting edge technology. Technology at the service of storytelling, in other words.

At the same time, the iPhone, brilliant as it is, wasn’t introduced into a vacuum. It has meaning and remains a huge cultural force (along with its Android cousins) not because it represents an incredible engineering accomplishment but because it is so good at delivering content created by people who go pale at the thought of anything to do with math and science and engineering.

What I’m saying is that the worlds of the arts and sciences need each other, complement and fulfill each other, and together enrich all our lives.

So I say to Harry and to the iPhone, Happy Birthday. Here’s to the artists, like Rowling, whose creative genius has entertained and inspired and amused and thrilled and shocked us and made us think about our world in ways we never would have discovered on our own. And here’s to the wildly inventive engineers and visionaries at Apple – not least including the late Steve Jobs – and the creative minds at other hi-tech outfits who have invented new tools that help us connect to one another in new ways, ways that even Harry Potter and his friends at Hogwarts would have considered magic.

When I think of the Potter books, my first thought is always of my kids in the back seat of the car during our big summer vacation about 15 years ago where we drove through some of the most spectacular country in the US: the Tetons, Yellowstone, Glacier. About halfway through the trip, the latest Harry Potter book was published – it must have been book 5 – and we just had to stop at a bookstore in Missoula to get a copy. As it happened, neither child was willing to wait for the other to finish it and in the interest of family harmony we bought two copies. I’m not sure how much of Glacier or the Tetons they saw – they spent the rest of the trip caught up in that magical story.

If the Harry Potter series is magical – and I think that’s a good way to describe the books – then the iPhone and its kin are magic, or as near to magic as we can imagine: Think what it can do compared to what we thought possible even 25 years ago. It really is as science fiction grandmaster Arthur C. Clarke observed: “Any sufficiently advanced technology is indistinguishable from magic.”

See you next time.

– Bill Murphy (MS 1468, 505-845-0845, wtmurph@sandia.gov)

Student volunteer project hits close to home for Sandia intern

Katrina Wagner

Mariana Castaneda (2616) had to grow up fast. At age 7 and in the second grade, her mother felt a lump on her little sister Marisol’s head. It was a malignant tumor that required treatment. The family traveled far from home to Phoenix and stayed at a Ronald McDonald House, which provided them a home away from home while Marisol was hospitalized.



“I WONDER what kind of person my sister would have been,” says Sandia intern Mariana Castaneda, who volunteered this summer at a Ronald McDonald House, which years ago provided a home for her family when her baby sister was undergoing treatment for a cancer that ultimately proved fatal. “No matter where I go, my sister goes with me.” (Photo by Tineca Quintana)

Despite surgery and cancer treatment, Marisol died at just 2 years old. Mariana and her family were devastated by the loss. Her parents gave back by volunteering at the Ronald McDonald House and other nonprofit agencies that provide support to families living through the serious illness of a child.

A place to feel at home

When Mariana saw an advertisement for a student intern volunteer project, she signed up immediately. “It is a sad story, but I feel like it is very important to give back to an organization that gave my younger sisters and myself a place to feel at home.”

Mariana and several Sandia interns participated in a service project at the Ronald McDonald House on June 17 where they pulled weeds, picked up trash on the grounds, and bagged laundry detergent for the families staying there. The organization was there for her family and “made them feel so welcomed.” Working at the house brought back both happy and sad memories for her. “It even smells the same.”

Mariana is passionate about giving back and sharing with others that it is possible to come back from tragedy.

“It is important for people to be able to share these experiences with others,” she says, “because not only is it a living memory of those who are gone, but it also humbles you to know that life, as precious and as difficult as it can be, is a fragile gift and if we as human beings can recognize that bonds between people are formed through experiences and lessons learned, this world would be much more peaceful.”

Mariana lives in El Paso, Texas, and studies mechanical engineering at the University of Texas at El Paso. She also works as a research assistant for the National Science Foundation’s Partnership for Research and Education in Materials program. Mariana wants to become a defense missiles engineer and says, “I like the pressure behind the job.” This summer, she’s working as a design and integration intern in the Advanced Surety Mechanisms Department as part of the NW SPRINT Program.

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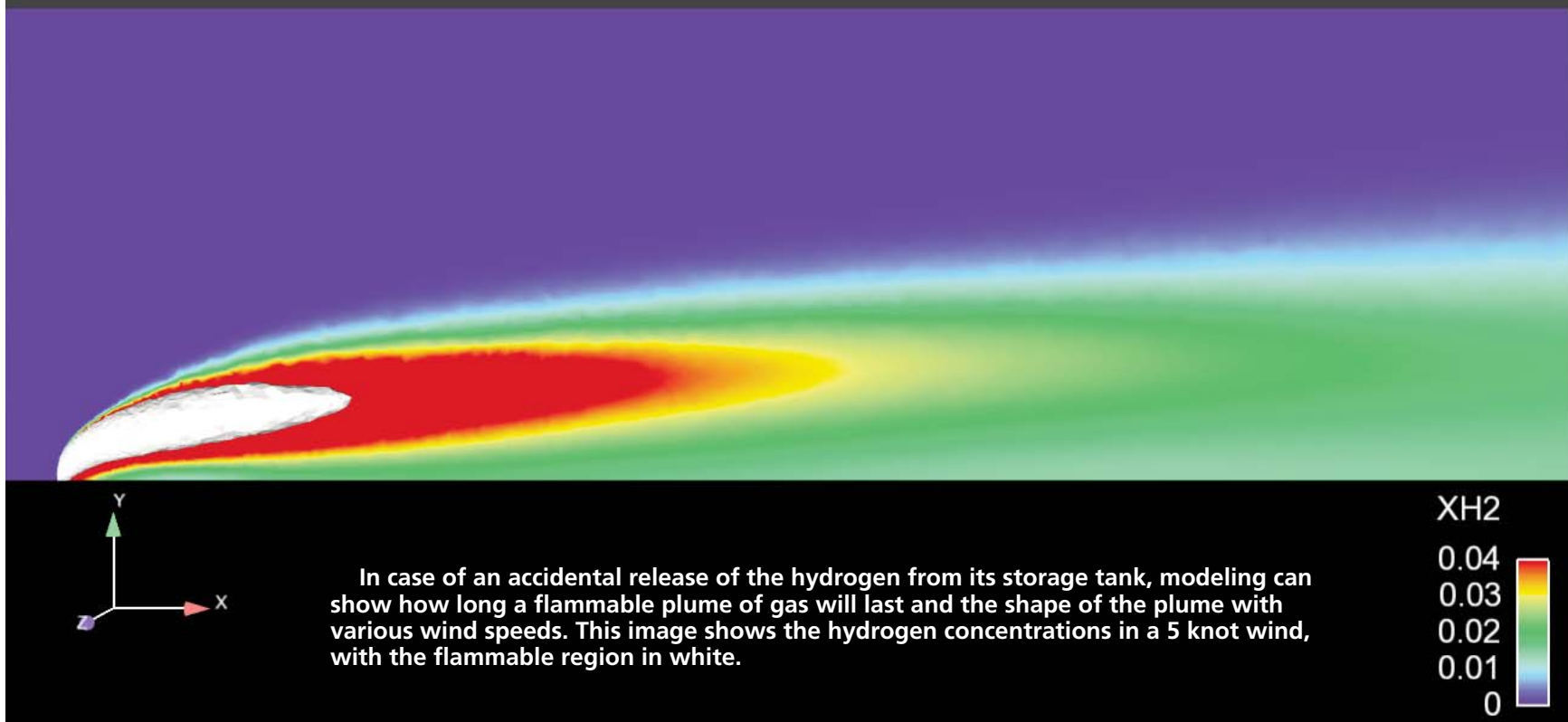
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Time = 70 sec**5 knot wind**

Sandia looks at optimization of hydrogen-powered passenger ferries

By Michael Padilla

Maritime transportation has emerged as one solution to the traffic gridlock that plagues coastal cities. But with urban passenger ferries operating in sensitive environments and tourist areas, hydrogen fuel-cell powered boats offer a quiet, zero-emission alternative to conventional diesel vessels.

In its San Francisco Bay Renewable Energy Electric Vessel with Zero Emissions (SF-BREEZE) study, researchers at Sandia have concluded that liquid hydrogen fuel cells are feasible on technical, regulatory, and economic bases. Now, researchers are taking the work to the next level in a second study that focuses on:

- the optimal combination of vessel design, speed, and passenger capacity, which, once determined, could reduce uncertainty in the industry; and
- the technical evidence to support new safety codes for hydrogen fuel-cell vessels.

The work is funded by the Department of Transportation Maritime Administration's Maritime Environmental and Technical Assistance program.

"The Maritime Administration sees immense potential in the use of hydrogen fuel cells to provide efficient, clean, domestically produced power for the maritime sector. The current effort, to improve the economic viability using fuel cells in a commercial vessel, will bring this vision one step closer to reality," says John Quinn, Maritime Administration associate administrator for environment and compliance.

Optimizing how renewable hydrogen can best reduce carbon emissions

The initial feasibility study focused on a 150-passenger ferry traveling at 35 knots. Now, mechanical engineer and project lead Joe Pratt (8366) is asking whether it makes sense to design ferries that are faster or slower, larger or smaller.

Sandia started by plotting typical speeds and passenger capacities of about 600 passenger ferries around the country and found that the ferry studied in the SF-BREEZE project was actually an outlier, being faster and having fewer passengers than most.

"Although previous work on the SF-BREEZE project demonstrated the feasibility of using hydrogen fuel cells for propulsion power on a high-speed passenger vessel, it became apparent that there may be better economic returns when applied to slower vessels," says Curt Lefers, project manager at Elliott Bay Design Group, which is leading the naval architecture work in the new study. "The next logical step in the process is to examine the effect of speed and passenger count on the overall cost and per-passenger emissions for hydrogen fuel-cell powered passenger vessels, which is why the optimization study is important."

Joe adds, "How do you achieve the best economics compared to conventional diesel technology and the best gain in environmental impact? Answering these questions is how we'll be quantifying the merits of different designs."

The study seeks to make the trade-offs for the ship-

building and ferry industries clear. The heavier and faster the vessel, the more power required. To obtain more power, fuel cells — the most expensive part on a hydrogen powered ferry — must be added, which drives up the cost.

"You get a double benefit by going slower: you reduce the power required by the fuel cells and the cost of the fuel cells, and you reduce the fuel consumption, so you reduce your operating expense," Joe says. "That's an example of why we're thinking about this and looking at other designs."

Sandia hopes to produce a half dozen ferry concepts to demonstrate which are most economical and which will make the most impact on protecting the environment, Joe says.

Tom Escher is president of the Red and White Fleet, a San Francisco Bay ferry operator that was a partner in



applied to hydrogen powered vessels, but they may not accurately represent the properties of hydrogen.

For example, the LNG code states that LNG vessels are required to have a clearance of 30 feet around all sides of their vents. Because hydrogen is lighter than natural gas and much lighter than air, it does not sink in air like LNG does. As a result, a 30-foot clearance underneath a vent might not be a necessary requirement for a hydrogen ferry, says Sandia mechanical engineer Myra Blaylock (8253), technical lead for the project.

The Sandia researchers are using computer simulation to explore and analyze four common vent and leak scenarios in which hydrogen could be released on-board



SANDIA ENGINEERS Joe Pratt, left, and Myra Blaylock discuss recent modeling results that can inform accurate regulations for using hydrogen fuel onboard ships. (Photo by Randy Wong)

the initial study. He says he looks forward to moving ahead with new ferry designs.

"The maritime industry needs to move to zero emission for the sake of our globally shared environment," Escher says. "This study is tremendously helpful by pointing out how to do that in the smartest way possible and we look forward to using the results to build the first zero-emission hydrogen passenger vessel in the US."

Updated regulations could clarify path forward for industry

Sandia is reviewing International Maritime Organization codes for liquid natural gas powered vessels and developing a technical basis for codes that could be created for hydrogen fuel-cell vessels. Currently, liquid natural gas codes are the closest regulations that can be

vessels to show actual hydrogen behavior.

The underlying physics models for the simulations, validated through experiments, allow researchers to confidently explore various scenarios in a quicker and less-expensive way than conducting experimental work for each individual case. The results can be used by the International Maritime Organization to ensure the accuracy of the codes when applied to hydrogen vessels.

The possibility of extending the applications of hydrogen fuel cells, showing the industry the best path forward and providing the technical basis for new hydrogen regulations all have "the potential for impact across the entire maritime sector," Joe says. "A lot of these vessels can travel in ecologically sensitive areas where there is an extra motivation for making them clean. So, it's about localized as well as global emissions benefits."

Street smart: Goodyear and Sandia

(Continued from page 1)

“But a tire is a complex system, and that’s something Sandia knows well. The partnership allows Sandia to enhance our software toolkits and improve our capabilities for mission applications while simultaneously addressing Goodyear’s proprietary challenges.”

Sandia and Goodyear signed a Cooperative Research and Development Agreement, or CRADA, in 1993, back when technology transfer from the national labs was in its nascent heyday. In 1980, the Stevenson-Wydler Technology Innovation Act was signed into law by President Jimmy Carter, becoming the first major US technology transfer legislation. It required federal laboratories to actively participate in and budget for technology transfer activities. Stevenson-Wydler was followed by the Federal Technology Act of 1986, the second major piece of legislation focused on tech transfer from federal government agencies to the private sector. It established the Federal Laboratory Consortium and let federal labs enter into CRADAs with private industry.

“ Instead of building and testing three to five prototypes before a tire was ready for manufacture, they could use our computer codes to develop one. Time was dramatically reduced, by half or more.”

— Mary Monson, senior manager
Technology Partnerships Dept.

“Tech transfer was an exciting new opportunity for the labs,” Mary says. “The Department of Energy really embraced the tech transfer concept for federal agencies in the late 1980s, early 1990s. Part of the defense programs budget was put aside for US economic security for the nation as well as enhancing the unique capabilities of the labs through solving complex real-world problems. Labs made proposals and were awarded funding to collaborate with partners.”

Designing the ideal tire

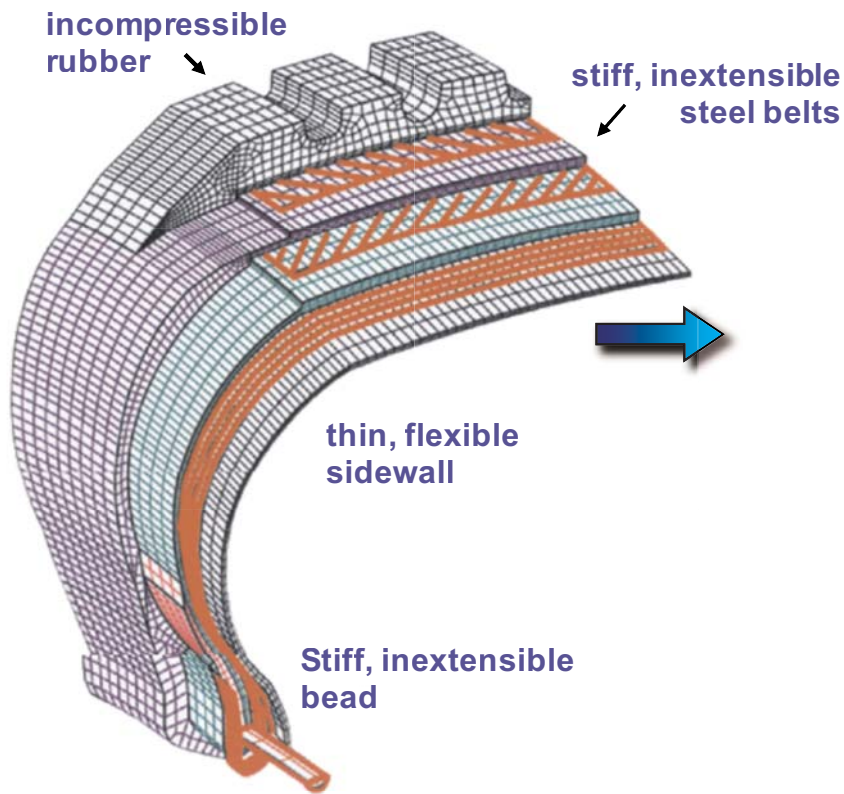
Goodyear took note. It was the only remaining US tire manufacturer and needed to cut its R&D budget to stay competitive with companies like Bridgestone and Michelin. The company reached out to Sandia in the summer of 1992 and executives and scientists forged a relationship through back-and-forth visits to each other’s sites.

“They looked at our advanced computational mechanics software applications developed for nuclear weapons programs after the government halted underground testing and saw that they could be applied to tires. Instead of building and testing three to five prototypes before a tire was ready for manufacture, they could use our computer codes to develop one,” Mary says. “Time was dramatically reduced, by half or more.”

Sandia’s tools went to work on the many components of a tire system.

“It’s often surprising to people to learn just how complicated it is to model and simulate tire performance, considering millions of material combinations and permutations and blending structural mechanics, rigid body, and fluid dynamics under varying temperature, pressure, and wear conditions,” says Dale Moseley, Goodyear’s global project manager.

The collaboration produced the Assurance TripleTred, a unique all-weather tire with a three-part tread pattern. Goodyear wanted a visually distinctive tire that would generate buzz and demonstrate its best technology and quality, in 12 months. The Assurance line was launched in 2004, and in 2005 Sandia and Goodyear won a joint



COMPUTER MODEL – This simulation shows a finite-element model of a typical tire. As a result of its partnership with Sandia Labs, Goodyear Tire & Rubber Company models its tire designs before molds are ordered.

R&D 100 Award for the tires, particularly the TripleTred, which was brought from concept to market in less than a year. Goodyear says the tire could not have been produced without modeling and predictive testing tools developed with Sandia.

A wide range of lab technologies have played a role in the CRADA including advanced computational mechanics, computational simulation and verification, elastomeric materials, structural and tire dynamics, advanced manufacturing of rubber products, efficient characterization methods for structural dynamics, reliability tools for manufacturing processes, sensor systems, data science, human reliability, and engineered products.

Competitive advantage in a complex business

Today 100 percent of tire designs at Goodyear are modeled before molds are ordered. The company is in the top three of the world’s largest tire manufacturers and credits its work with Sandia for reducing new product development times, producing better tires and manufacturing methods, boosting efficiency, and lowering R&D costs, all contributing to a competitive advantage in a complex industry. “Our relationship with Sandia has been very beneficial in our competitive success in the global automotive industry, allowing us to begin submitting ‘virtual tires’ to automakers that can be incorporated into their vehicle models early in the development process as they tune the vehicle designs,” Moseley says.

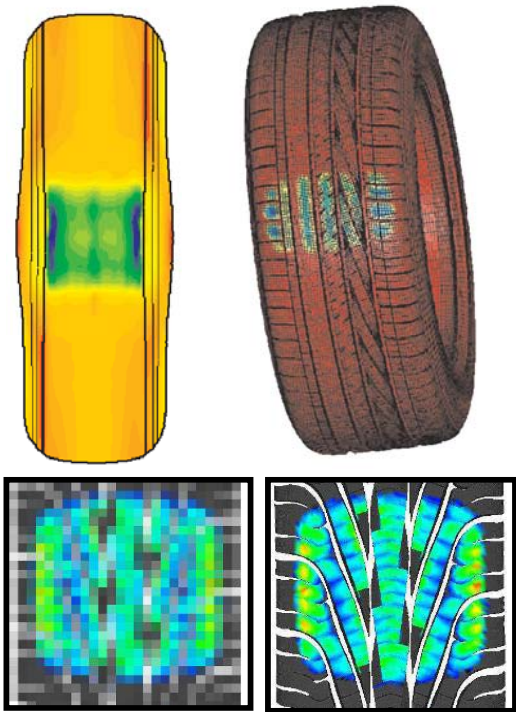
“We focus on strategic technical challenges where advanced technology from both sides can change the future. Almost without fail, the new capabilities they commission us to develop, for example, to model rotating, twisting, and deforming tires, help us with simulations in our national security work.”

— Ted Blacker, manager
Simulation Modeling Sciences Dept. 1543

Technology Breakthrough 1994-1996

“The Pneumatic Tire Represents One of the Most Formidable Challenges in Computational Mechanics Today”

A. Noor, Journal of Computers and Structures



Before

After

AN EARLY EXAMPLE of applying computer analysis to tire technology.

The CRADA has been renewed repeatedly since 1993 and Goodyear continues to produce innovative products developed in collaboration with Sandia. “So many good things have come out of this enduring partnership,” Mary says. “It has worked both ways. We were able to apply our codes to a real-world problem, and improve our codes. And Goodyear was able to develop revolutionary products.”

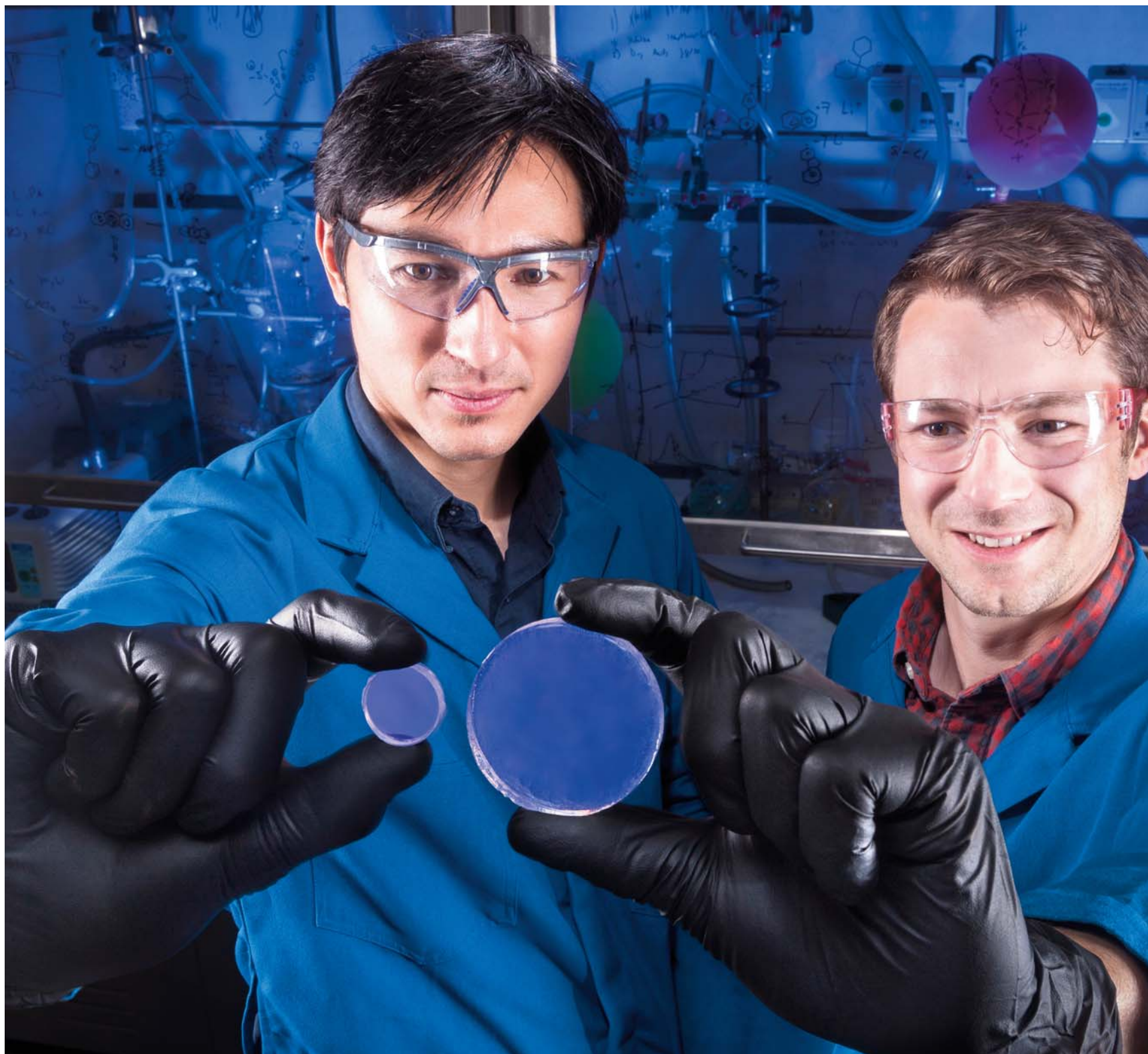
Ted Blacker, manager of Simulation Modeling Sciences Dept. 1543, says the partnership has been successful because it is strategic. “We focus on strategic technical challenges where advanced technology from both sides can change the future,” he says. “Almost without fail, the new capabilities they commission us to develop, for example, to model rotating, twisting, and deforming tires, help us with simulations in our national security work.”

Much research done under the CRADA has been applied to Sandia’s science-based nuclear weapons stockpile stewardship mission. Finite-element analysis let Sandia look closely at re-entry vehicle vibration, and research on predicting materials lifetimes addressed design issues ranging from large-scale weapon component deformation to advanced earth penetrators.

The work with Goodyear led to a deeper appreciation at Sandia of the value of computer modeling in the early stages of development. “We showed that modeling and simulation made a difference in developing better products faster,” Ted says. “Our computational tools typically were used late in the process to understand why something broke and how to fix it. Now we use modeling more in the up-front stages, such as in the early design, to reduce testing.”

Mary says CRADAs are an important technology transfer tool. “They help us sustain and improve our capabilities because we’re applying our technology to a company’s pressing problems,” she says. “There’s an urgency. It’s not abstract.”

She says the Goodyear CRADA has allowed Sandia researchers to work with peers in industry and share best practices. “It really is collaborative,” she says. “Both teams bring a different way of looking at a problem. We have learned a lot through those interactions about how to approach problems differently.”



SANDIA RESEARCHER PATRICK FENG, left, holds a trans-stilbene scintillator and Joey Carlson holds a scintillator made of organic glass. The trans-stilbene is an order of magnitude more expensive and takes longer to produce. (Photo by Randy Wong)

A scintillating discovery at Sandia

(Continued from page 1)

much easier and cheaper to produce. Organic glass is a carbon-based material that can be melted and does not become cloudy or crystallize upon cooling. Successful results of Sandia's Defense Nuclear Nonproliferation project team's tests on organic glass scintillators are described in a paper published this week in *The Journal of the American Chemical Society*.

Sandia materials scientist and principal investigator Patrick Feng (8726) started developing alternative classes of organic scintillators in 2010. Patrick and his team set out to "strengthen national security by improving the cost-to-performance ratio of radiation detectors at the front lines of all material moving into the country." To improve that ratio, the team needed to bridge the gap between the best, brightest, most sensitive scintillator material and the lower costs of less sensitive materials.

Inspiration from light-emitting diodes leads to performance boost

The team designed, synthesized, and assessed new scintillator molecules for this project with the goal of understanding the relationship between the molecular structures and the resulting radiation detection properties. They made progress finding scintillators able to indicate the difference between nuclear materials that could be potential threats and normal, non-threatening sources of radiation, like those used for medical treatments or the radiation naturally present in the atmosphere.

The team first reported on the benefits of using organic glass as a scintillator material in June 2016. Organic chemist Joey Carlson says further breakthroughs really became possible when he realized scintillators behave a lot like light-emitting diodes.

With LEDs, a known source and amount of electrical energy is applied to a device to produce a desired amount of light. In contrast, scintillators produce light in response to the presence of an unknown radiation source material. Depending on the amount of light produced and the speed with which the light appears, the source can be identified.

Despite these differences in the ways they operate, both LEDs and scintillators harness electrical energy to produce light. Fluorene is a light-emitting molecule used in some types of LEDs. The team found it was possible to achieve the most desirable qualities — stability, transparency, and brightness — by incorporating fluorene into their scintillator compounds.

Pushing past crystals and plastics

The gold standard scintillator material for the past 40 years has been the crystalline form of a molecule called trans-stilbene, despite intense research to develop a replacement. Trans-stilbene is highly effective at differentiating between two types of radiation: gamma rays, which are ubiquitous in the environment, and neutrons,

which emanate almost exclusively from controlled threat materials such as plutonium or uranium. Trans-stilbene is very sensitive to these materials, producing a bright light in response to their presence. But it takes a lot of energy and several months to produce a trans-stilbene crystal only a few inches long. The crystals are incredibly expensive, around \$1,000 per cubic inch, and they're fragile, so they aren't commonly used in the field.

Instead, the most commonly used scintillators at borders and ports of entry are plastics. They're comparatively inexpensive at less than a dollar per cubic inch, and they can be molded into very large shapes, which is essential for scintillator sensitivity. As Patrick explains, "The bigger your detector, the more sensitive it's going to be, because there's a higher chance that radiation will hit it."

Despite these positives, plastics aren't able to efficiently differentiate between types of radiation — a separate helium tube is required for that. The type of helium used in these tubes is rare, non-renewable, and significantly adds to the cost and complexity of a plastic scintillator system. And plastics aren't particularly bright, at only two-thirds the intensity of trans-stilbene, which means they do not do well detecting weak sources of radiation.

For these reasons, Sandia's team began experimenting with organic glasses, which are able to discriminate between types of radiation. In fact, Patrick's team found that the glass scintillators surpass even the trans-stilbene in radiation detection tests — they are brighter and better at discriminating between types of radiation.

Another challenge: The initial glass compounds the team made weren't stable. If the glasses got too hot for too long, they would crystallize, which affected their performance. Feng's team found that blending compounds containing fluorene to the organic glass molecules made them indefinitely stable. The stable glasses could then also be melted and cast into large blocks, which is an easier and less expensive process than making plastics or trans-stilbene.

From the lab to the ports

The work thus far shows indefinite stability in a laboratory, meaning the material does not degrade over time. Now, the next step toward commercialization is casting a very large prototype organic glass scintillator for field testing. Patrick and his team want to show that organic glass scintillators can withstand the humidity and other environmental conditions found in actual port settings.

NNSA has funded the project for an additional two years. This gives researchers time to see if they can use organic glass scintillators to meet more national security needs.

Going forward, Patrick and his team also plan to experiment with the organic glass until it can distinguish between sources of gamma rays that are non-threatening and those that can be used to make dirty bombs.

The Long Game



By Nancy Salem • Photos By Randy Montoya

Note to readers: This story was the anchor article for the most recent *Sandia Research* magazine. It was written just prior to the transition of the Sandia M&O contract from Lockheed Martin to National Technology and Engineering Solutions of Sandia LLC. Despite the change of faces at the top of the program, the Research Challenges initiatives described here are ongoing.

Sandia Labs is a famously mission-driven place. Thousands of scientists and engineers work every day to help the US identify and defeat threats to national security, some nuclear, some chemical and biological, and some just plain terrorism.

Then-VP Steve Rottler knew it when he took over as chief technology officer and vice president of research in 2009. He also knew that research is vital to carrying out the national security mission. “It was going to be very important for Sandia’s research community to have a sense of strategy that could be married with the mission,” he says. “Research should drive the mission, even as research is being responsive to the mission.”

And an idea was born. As Steve and his team developed a technical strategy for the future of research at the Labs, the concept of Research Challenges emerged. “They were intended to be bold ideas that would excite and inspire the research community,” he says. “We wanted to better integrate mission with research and vice versa, and do it in a way that would lead to Sandia being recognized not only as mission oriented, but as a research powerhouse.”

Today Sandia has 11 active Research Challenges, organized and put into action largely by Julia Phillips, Steve’s successor as chief technology officer. They are designed to

produce breakthroughs that impact the mission and contribute in their own right to advancing the frontiers of science and engineering. They are:

- Beyond Moore Computing
- Data Science
- Detection at the Limit
- Engineering Abiotic-Biotic Living Systems
- Engineering of Materials Reliability
- Power on Demand
- Pulsed Power Opportunities for Weapons & Effects Research
- Resiliency in Complex Systems
- Revolutionary Approaches to the Stockpile
- Science and Engineering of Quantum Information Systems (SEQIS)
- Trusted Systems and Communications

The hallmark of a Research Challenge is work that spans a decade or more and cuts across many disciplines, says former Div. 1000 VP Rob Leland. Rob succeeded Julia as chief technology officer and succeeded Steve as VP of Science and Technology after Steve became VP and head of Sandia’s lab in Livermore, California, and later deputy laboratories director and executive vice president for National Security Programs. “What really sets the Research Challenges apart is that the researchers are thinking strategically how to advance a technology across mission areas over a long scale,” he says. “It’s a compelling roadmap that envisions how we get from relatively basic early stage research to something that can have mission impact in a coordinated way using a combination of resources such as Laboratory Directed Research and Development [LDRD] and direct funding from multiple program areas.”

Organize people on a larger scale

Research Challenges are part of a Sandia research strategy that includes the LDRD and Grand Challenge LDRD programs, which award funding through a competitive proposal process. LDRD projects run three years and



have potential for strong mission impact. Grand Challenge LDRD projects, also three years, are larger and focus on bold, high-risk, high-reward ideas.

The longer-term Research Challenges gain momentum when associated projects win Grand Challenge LDRD support. “We want to see the Research Challenges organize people on a larger scale, and Grand Challenges are one aspect of that,” says Andy McIlroy, director of Energy and HS Program Management Center 8100 and previously deputy chief technology officer and director of Research Strategy and Partnerships. “Many of the successful Grand Challenge proposals are aligned with one or more of the Research Challenges. The proposals maturing out of Research Challenges tend to be particularly compelling and well thought out.”

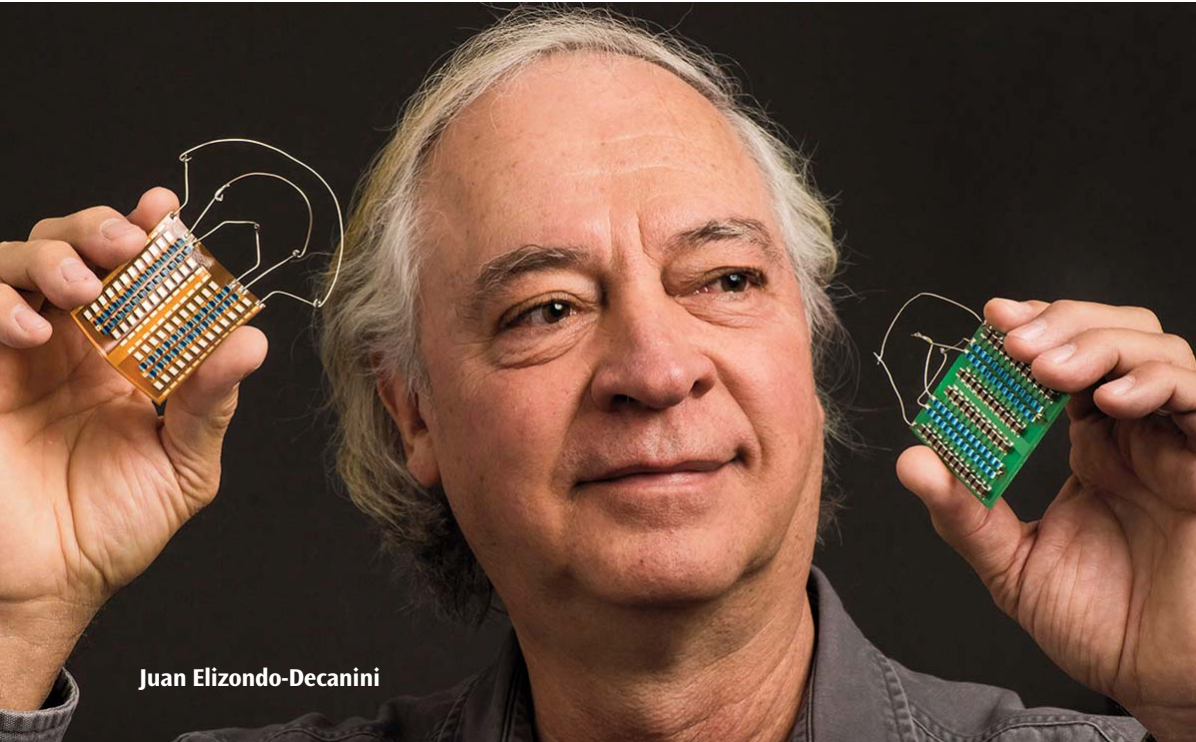
The LDRD program is funded as a percentage of all the programs that come into the Labs, currently at about 6 percent or \$155 million a year. About 20 percent of Sandia’s LDRD portfolio is connected to Research Challenges.

Halfway into the 10-year vision, several Research Challenges are showing results and have won Grand Challenge LDRD funding, Andy says. The SEQIS challenge around

quantum computing has made significant progress by coordinating efforts across a number of research fronts.

“SEQIS is a model Research Challenge. They actually started behaving like a Research Challenge before the concept existed,” Andy says. “The fact that we have qubits on a chip and a vision about how to connect those together and create what starts to look like a quantum computer on a chip would have been a big stretch five to 10 years ago. They have accelerated Sandia’s position in that community to where we are viewed as being one of the leading research institutions in quantum computing.”

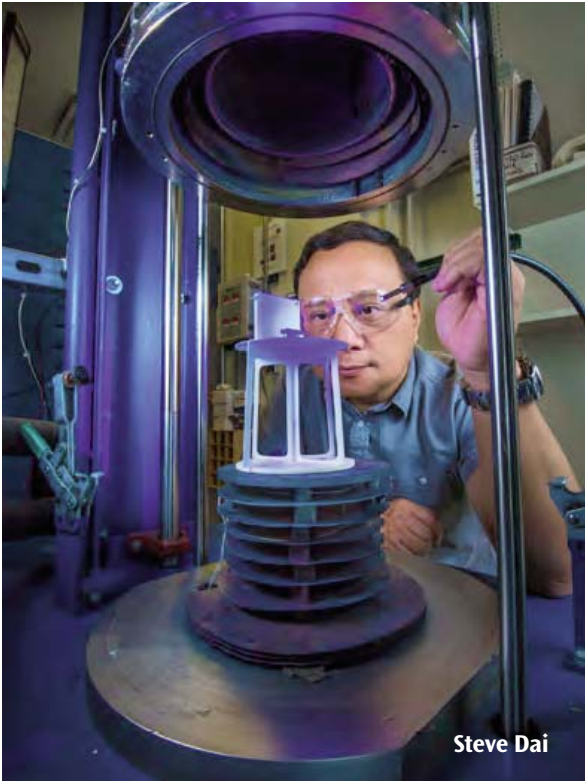
And Power on Demand is moving strongly in multiple directions, propelled by several Grand Challenges,



Juan Elizondo-Decanini



Kira Fishgrab



Steve Dai



Rachel Trojahn

Research at a national laboratory is often driven by tight deadlines. But what if a big idea needs more time to go from impossible to possible? A Research Challenge lets it play out and make a difference.

Andy says. One of them, on ultra-wide bandgap, has published results showing it's possible to make transistors and diodes from advanced semiconductor materials that could perform much better than silicon, the workhorse of the modern electronics world. The breakthrough work takes a step toward more compact and efficient power electronics, which in turn could improve everything from consumer electronics to electrical grids.

"Their vision is getting out beyond Sandia and having impact," Andy says. "That's what we want with Research Challenges, something that will make a difference in the world."

Technical passion and skilled management

Research Challenges organize around technical staff and senior management who have a strong interest in the area. "They bring together the technical passion and some ability and expertise around marshaling and leading a larger effort. The most successful challenges have both those components," Andy says. "What matters most is passion and excitement around the Research Challenge, a vision to drive it forward."

The teams build organically around the technical and executive leaders. "The strength is the community that comes together," Andy says.

Sandia computer scientist Rick Muller, who works on the SEQIS quantum computing challenge, says it has been a high point of his technical career. It was eye-opening to collaborate with people from different disciplines, he says. "These are the best people I've ever worked with," he says. "The research plan we put together explores new applications of quantum technologies that will be important to Sandia and the nation over the next 10 years, something that was particularly exciting given the team's diverse strengths."

A panel of laboratory fellows and senior scientists reviews the Research Challenges each year to see if they are headed in the right direction. "We're coming to believe there should be an end point to a Research Challenge,

maybe 15 years out," Andy says. "If constructed in the purest form, they are trying to address a challenge and at some point we will have gotten there. We're still trying to tease out what the graduation requirements are. We're pushing them to have a concrete thing they reach for, a game-changing concept. At some point the work is no longer a challenge but a fundamental part of the capabilities that drive the Labs forward."

Mathematician and computer scientist Tim Trucano, who chairs the review panel, says the value of a Research Challenge is in its power to integrate the Labs and provide the time and space to move down a complex path with a goal in mind, at the end delivering compelling, mature, and usable research results. "They are essential because of what they're trying to do," he says. "This work is critical to the Labs and to the nation."

A pure vision

Rob says the Research Challenges fulfill Sandia's mission as a Federally Funded Research and Development Center, or FFRDC, by advancing the state of the art in science and technology. "The challenges are a pure expression of that," he says. "We're creating a vision to solve a problem that we think has national importance. We figure out how to connect the dots to make that happen and get where we want to go. FFRDCs should be taking a leadership role in pushing the state of the art."

Steve says the challenges have helped integrate research at the Labs and produced world-class, world-recognized science. "I'm pleased with the trajectory," he says. "We should continue trying to get better and better. For me there was never a destination. It was and is a journey."

Rob says the challenges show the value of a national laboratory. "We can address an issue that's important that might be outside the scope of what people are even thinking is possible today, and pursue it so that in 10 years we've got something ready to go," he says. "People might think, 'Maybe that's possible.' We can say, 'It's not only possible, here it is.' That's what a national lab can do."



Laura Matzen

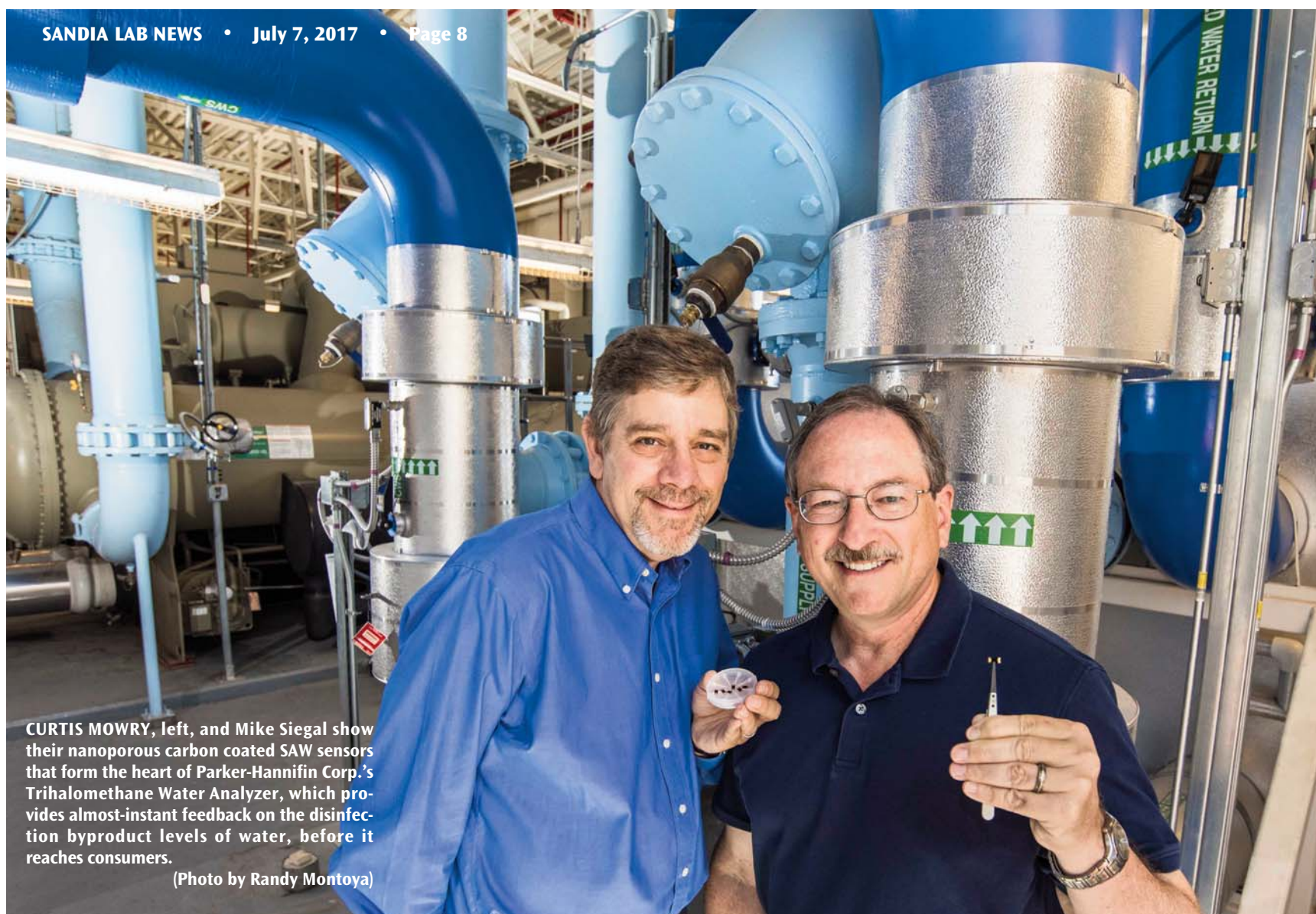
About the magazine

Scan this code to launch Sandia Research magazine on your mobile device.

The latest issue of Sandia Research magazine takes a close look at the Labs' 11 Research Challenges and their impact on the highest levels of science and engineering. The challenges were designed to produce breakthroughs that advance Sandia's national security mission and the frontiers of science and engineering. Stories of each challenge and the key players are told in the magazine.

The innovations and breakthroughs developed at Sandia address concerns like climate, domestic and international terrorism, clean and affordable energy, and the safety, security, and reliability of the nuclear deterrent. The magazine chronicles Sandia's technical impact across the national security arena, spanning a spectrum of disciplines from materials science to microsystems to pulsed power.

The magazine is targeted to a national audience of industry, academia, and government readers. Sandians can read the magazine at www.sandia.gov under the "News" then "Publications" tabs, or by scanning the QR code above on a mobile device.



Clean water that's 'just right' with Sandia sensor solution

By Mollie Rappe

Water utilities face a Goldilocks dilemma: If they don't add enough chlorine, nasty bacteria that cause typhoid and cholera survive the purification process. Too much chlorine produces disinfection byproducts such as chloroform, which increase cancer risks. The amount of chlorine needs to be "just right" for safe drinking water.

The Environmental Protection Agency regulates how much of the disinfection byproducts, including those known as trihalomethanes, are allowed in drinking water. But if water utilities want to monitor and control their own trihalomethane levels, they have to send off samples and wait weeks for analysis by an EPA-qualified lab.

Working with Parker-Hannifin Corp., Sandia combined basic research on an interesting form of carbon with a special microsensor that came out of Sandia's first Laboratory Directed Research and Development Grand Challenge, to make an easy-to-use, tabletop tool that quickly and cheaply detects extremely low levels of each trihalomethane: chloroform, bromoform, bromodichloromethane, and dibromochloromethane.

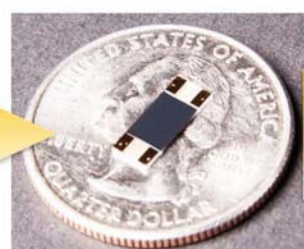
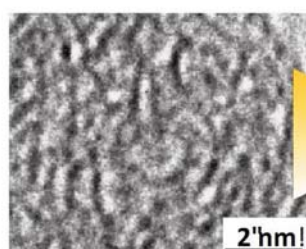
No longer do utilities need to send off samples to EPA-qualified labs, hire their own highly trained chemist to perform the EPA test, or buy an expensive mass spectrometer system to monitor their trihalomethane levels, says materials scientist Mike Siegal (1874).

Recently, Parker-Hannifin released an automated online version of the water analyzer for continuous monitoring of trihalomethanes.

Cool and controllable carbon coatings

The goal of Sandia's first LDRD Grand Challenge was to make a hand-held chemistry lab, like a tricorder, to detect airborne hazardous chemicals, including chemical weapons. A principal component of this lab-on-a-chip was a surface acoustic wave sensor. This SAW sensor works by vibrating a wave along a quartz sheet, says analytical chemist Curtis Mowry (1852). By measuring how the wave changes on the SAW device, researchers can tell how many chemicals are sticking to the quartz surface.

In a way, it's similar to playing with a playground parachute. Those holding the parachute can tell the difference between a bunch of balls or a child by how the parachute moves when they shake it. However, the



TRANSMISSION ELECTRON MICROSCOPY image of nanoporous carbon (left), "the most controllable carbon in the world, in the terms of its mass density and its total surface area," according to Mike Siegal. A nanoporous carbon coated surface acoustic wave sensor on a quarter (middle). This sensor is the key component of Parker-Hannifin's Trihalomethane Water Analyzer (right).

quartz surface isn't very sticky, which limits its sensitivity. This is where a special carbon coating comes in.

Natural carbon can appear as exotic diamonds, common graphite composed of many layers of graphene sheets, and many other forms. Nanoporous carbon consists of stacked nanofragments of graphene sheets, engineered with lots of "nooks and crannies" where chemicals can lodge. Unlike carbon nanotubes or graphene, with similar molecularly "sticky" surfaces, nanoporous carbon can be grown onto almost anything, including SAW devices, says Mike.

This growth process, known as pulsed laser deposition, involves zapping graphite with a laser at room temperature. The liberated carbon atoms fly through a vacuum chamber to coat the SAW sensor in a uniform and reproducible manner. By adding a little bit of an inert gas to the vacuum chamber, Mike can control and vary the density and total surface area of nanoporous carbon coatings from very fluffy to as solid as pure graphite.

For the SAW sensors, nanoporous carbon with a middling density turns out to be best. Only three grams of such nanoporous carbon has as much surface area as a football field, yet is rigid enough to work for SAW sensors.

To extend the parachute metaphor, nanoporous carbon is like Velcro, capturing every ball that touches the parachute. Mike says, "The first time we applied the carbon coating, it turned out to be a thousand times better than any organic coating that Sandia, or anyone else, had ever studied to adsorb volatile chemicals."

Curtis adds, "The winning combination was teaming up with Mike and his nanoporous carbon coatings and using larger, almost retro SAW devices." For SAW devices — and for most electronics — smaller is better and newer. At the time, Sandia's newest and smallest SAWs used higher frequency vibrations with more advanced microelectronics. However they were also more expensive, harder to make, and less reliable. Using larger devices, roughly the dimensions of a Tic Tac, that were state-of-the-art in the '90s, it was easy to apply the nanoporous carbon coating — which increased the sensitivity a thousand times more than decreasing the size

— and dramatically decreased the cost of the device.

The journey from basic science to commercial product for the public good

The journey began in 2002, building on years of chemical sensor research and development. Curtis was trying to develop a sensor to detect volatile organic contaminants, such as chemicals from an industrial spill or leaks, in water. His presentation at a water quality conference caught the eye of a Parker-Hannifin engineer and led to the partnership in 2006.

It took several years to cross the "valley of death" from promising research to commercial product, but by 2011 Parker-Hannifin released its first Trihalomethane Water Analyzer. The second, online version of the analyzer can automatically monitor individual trihalomethane levels every hour. Parker-Hannifin has more dedicated trihalomethane analyzers installed in North America than any other company.

Other possible uses for nanoporous carbon coated SAW sensors include detecting homemade explosives, contaminants in air and water, and almost any volatile or semi-volatile organic compound, says Curtis.

Additionally, Mike and others are exploring using nanoporous carbon for battery anodes. Mike and Graham Yelton (5228) demonstrated the first steps toward viable magnesium ion batteries, which would be more energy dense than lithium ion batteries. Higher energy density batteries could lead to electric cars that can go farther, longer lasting cellphone batteries, even satellites with longer missions. Katie Harrison (1874) and Mike have continued this work by adding silicon to lithium ion battery anodes, which could potentially triple their energy storage density.

The initial and follow-on work by Mike, Curtis, and their teams was funded by Sandia's LDRD program.

"Everybody who's been involved with this project always smiles when they talk about it," Mike says. "Not only did we see our basic research into what this carbon material was and the physics of how SAW devices work come together, but we helped develop a successful product that improves public health."

Women Worth Watching

Trio of Sandia women recognized as leaders in STEM, diversity

By Lindsey Kibler • Photos by Randy Montoya

Three Sandia women have received a Women Worth Watching award, presented by Profiles in Diversity Journal.



CAROL ADKINS

Chemical engineers Carol Adkins and Justine Johannes each received a Women Worth Watching in STEM award and were profiled in a recent special STEM (science, technology, engineering, and math) edition of the journal. Carol is director of New Mexico Energy and Geoscience Center 8800 and Justine is director of Stockpile and Weapon Product Realization Center 6600.

“Collectively, these leaders are breaking barriers for women in STEM careers and we are honored to recognize them as well as the companies supporting them,” said publisher James R. Rector. “Supporting women in STEM is an essential part of a worldwide strategy to innovate, educate, and build a more connected world.”

Sandia Chief Diversity Officer Esther Hernandez was named a Women Worth Watching recipient as part of the magazine’s annual awards and will be profiled in the upcoming summer edition.

“Each year, we are extremely encouraged by the number of organizations in every sector that support the career advancement of women in their workplaces,” Rector said. “We have also been proud to provide an award with such meaningful impact on the movement for gender equity in workforce leadership.”

The award has recognized leading women executives for 16 years.

Carol Adkins

As Center 8800 director, Carol oversees Sandia’s solar, wind, hydro, grid, nuclear, and fossil energy programs for DOE.

Throughout her almost 30 years at the Labs in various positions and fields, Carol says she has seen fewer women in her current field of renewable energy. “I see it particularly in the wind industry. If there are 500 men at a meeting, I estimate there may be only five women,” she says.

Those numbers are not surprising to Carol. She attended the University of New Mexico, where she received a bachelor of science degree in chemical engineering. She went on to earn a doctorate in chemical engineering from the California Institute of Technology. “There were 15 students in my undergrad program and only two or three of them were female. At Caltech there were twice as many students in my year but the number of women stayed the same,” she says.

Carol says she believes that with continued efforts to encourage and support women and girls at every level and by raising awareness about how science and engineering can improve people’s lives, women will

advance in STEM.

“I entered my technical profession very conscious of my unique position as a woman and I learned to survive and thrive by behaving like the majority demographic, the white males with whom I worked,” she says. “Constantly left out of the ‘boys’ club,’ I learned to make my own networks and support the women around me.”

In 1987, she was hired by a female manager and she does not take for granted the position she is in now — to hire the most qualified and technically proficient professionals in their fields, regardless of gender, “to make sure we reach out broadly,” she says.

“I would like to see small, steady increases in the number of women in STEM. Making major institutional and cultural changes too quickly risks sustained progress, but if we can all keep the big picture in mind while we take small actions in our spheres of influence, we can move forward collectively,” she says.

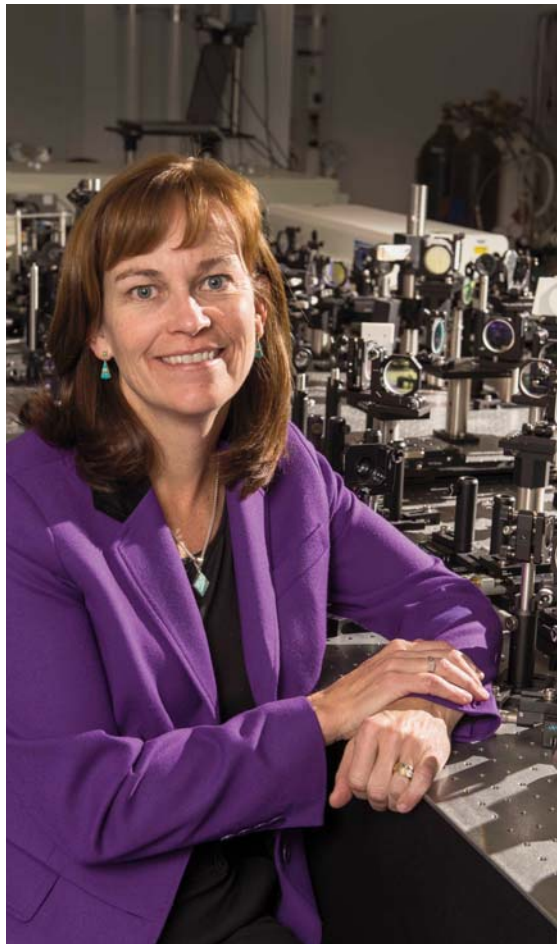
Carol is a mentor to a Caltech female graduate and numerous Sandia women. In 2015, she was named a UNM Distinguished Alumna of the School of Engineering.

Justine Johannes

Justine has always been uncomfortable with the idea of being recognized as a woman in STEM, preferring to be judged solely for her technical contributions.

“As I have gained experience, though, I have softened that position. I recognize the benefit of celebrating all types of successes. I was flattered to be acknowledged as a woman making technical contributions while also celebrating a growing peer group of women in STEM,” she says.

To close the gender gap in STEM fields, Justine says



JUSTINE JOHANNES

two important issues must be addressed. The first, she says, is keeping girls engaged in math and sciences in kindergarten through 12th grade. “It’s hard for them to move into STEM fields if they don’t have a sufficient background to be successful,” she says. Second, she says, it is vital to reach a tipping point where young girls see themselves as having peers and a community of women to engage in their jobs.

“I’m a big believer in helping to create a sense of community among the women in an organization so they can support each other,” Justine says.

While serving in a previous position as the director of engineering sciences, she saw the number of women in management positions nearly triple. “I believe a big part of this change was a sense of community that was created,” she says.

Justine says she expects the number of women in STEM fields to continue to increase, and hopes to see more women in engineering fields typically dominated by men.

“When you focus specifically on women in STEM, studies have indicated that women are significantly motivated by their ability to contribute to the wellbeing of society. I’ve experienced firsthand the technical contributions Sandia makes to our nation’s security; they

are incredibly compelling and provide an opportunity to contribute to society.”

Earlier this year, Justine was one of five alumni to receive the Distinguished Graduate Award from Cockrell School of Engineering at the University of Texas at Austin. Of the honor, Justine says, “Ultimately, I would not have been given this award without Sandia’s support of academic partnerships. The ability to work with universities to conduct research and attract talent enabled me to stay connected to the university long after I had graduated.”

Esther Hernandez

Esther (3010) works tirelessly to ensure Sandia Labs remains a place where building a diverse workforce and inclusive environment are top priorities.

“Very early in my career, I recognized the significance that the work environment plays in engaging employees as we come to work each day. I had jobs in which I truly felt like I was part of something important, and that energized me. I have also had some jobs where it was difficult to bring my full self into work every day,” Esther says. “I didn’t feel focused and creative.”

Even with the right environment, becoming a leader did not happen without support and guidance. “I had great mentors and champions throughout my career, and I feel strongly that it is my responsibility to give back in the same capacity.” Esther is actively involved in mentoring several early and mid-level career employees.

Early in her management career, Esther found herself facing an obstacle that undoubtedly shaped the leader she is today — her limited understanding of how her social style impacted her leadership style.

“As a ‘driving expressive’ I can be pretty intense when dealing with high pressures and short deadlines,” she says. At the time, she had “an incredibly diverse and capable team that worked well together and had a high level of trust.” One of the team members approached Esther and asked if they could speak privately. In their closed-door meeting, she was surprised at what she heard next. “She shared with me that she very much enjoyed working with me — except when we were under a lot of pressure. She explained that her style was much more amiable and analytic, and when I operated with her from a driving perspective she couldn’t function at her best.

“The message was not easy to hear but that advice, from a courageous and genuine employee, has served me well my entire career,” says Esther.

In addition to mentoring career women, Esther serves on Sandia’s Military Support Committee and is involved with the Wounded Warrior Career Development Program hiring initiative.

In summing up her feelings about her career she says, “When we love something we are good at, it doesn’t really feel like work.”



ESTHER HERNANDEZ

Mileposts



*New Mexico photos by Michelle Fleming
California photos by Randy Wong*



Nick DeReu
35 2337



John Norwalk
35 4855

Recent Retiree





Mark Garrett
34 6365



Karen Shanklin
35 6613



Pat Smith
35 2632



Sandy Ballard
30 6752



Jim Brown
30 2613



Tim O'Hern
30 1512



Lozanne Meyer
25 1181



Eva Wallace
25 2262



Lars Wells
25 6353



Tito Bonano
20 8840



Lisa Marron
20 5874



Danny Rintoul
20 1462



Aidan Thompson
20 1444



Al Brown
15 6786



Joe Burnside
15 2667



Jon Christensen
15 5422



Dan Derieg
15 4744



Kevin Fox
15 5255



Jeff Georgeson
15 1674



David Ho
15 6515



Lisa Kaneshiro
15 4250



Wesley Landaker
15 5323



Christian Maestas
15 2667



Glen Magee
15 5334



Adrian Miura
15 2262



Chris Nail
15 5863



Gerald Prudencio
15 2279



Alex Roesler
15 5440



Kimberly Ross
15 5877



Andy Scholand
15 6792



Kamilla Schwing
15 2275



Rick Sherwood
15 10111



David Siddoway
15 1387



Nicole Skyiepal-Cunningham
15 6335



Rob Warrick
15 6324



Ed Wyckoff
15 2276



SANDIA CLASSIFIED ADS

MISCELLANEOUS

KNEE SCOOTER, w/large pneumatic wheels, light outdoor use only, like new, \$150. Prior, 505-239-9586.

JEWELRY BOX, black leatherette, cream felt lining, 8 compartments, never used, 9-1/2" x 8-1/2" x 3", \$25. Wagner, 505-504-8783.

DINETTE, w/matching hutch, 7-pc., beautiful maple, pristine condition, text for photos, \$900/set. Lopez, 505-401-1422.

TIE DOWN SYSTEM, 68-in., new, Hi Lift Slide-N-Lock, 4 SS locking slides, mounting hardware. Ward, 505-296-2207.

NAVAJO RUGS, various sizes, never used; Kachina dolls; Hopi pottery, email for photos & sizes. Owens, 505-235-8671, padillaowens@q.com.

DOUBLE JOGGING STROLLER, \$100; playground set for toddlers, \$85; girl's clothes, size S & other toys; text for photos & more info. Willis, 505-206-9108.

DINING ROOM SET, Thomasville, cherry finish, 2 arm/4 side chairs, leather upholstery, 2 extensions, <https://albuquerque.craigslist.org/fuo/6180826554.html>, \$1,000. Martin, 505-670-9290.

SPEAKER STANDS, Sanus, silver w/black bases, adjustable height, 26"-40", excellent condition, \$15/pair. Gelet, 505-797-4599.

CARDINALS TICKETS, 4, section 436: Bears, Cowboys, 49ers, Buccaneers, Seahawks, Jaguars, Rams, Titans, Giants, prices vary. Lifke, 382-9448.

NOISE CANCELING HEADPHONES, Sony MDR-NC6, good for frequent airline travelers, etc. \$20. Jensen, 821-2373.

EXERCISE EQUIPMENT: Treadmill, NordicTrack T7si, \$100; Marcy Premier home gym, \$100. Vender, 505-385-2324.

CONVERTIBLE CRIB, converts to toddler bed, w/matching bed rail, oak color, photos available, \$100. Overholt, 505-250-7905.

WI-FI ROUTER, Netgear Nighthawk, AC1750, new, unopened pkg., \$85; galvanized cans w/lids, 4/6 gallon, new, \$30/both. Cocain, 550-8484.

DISCOUNTED TICKETS, Dierks Bentley, w/Cole Swindell & Jon Pardi, Isleta Amphitheater, Sept. 1, sec. 7, \$75/per ticket. Griffin, 822-0318.

OUTDOOR DOG KENNEL, 6' x 10', \$125; futon w/5-in. mattress, \$75; white 6-panel doors, \$15 ea. Buck, 353-2667.

LAMINATE FLOOR w/underlayment, ~150-sq. ft., medium oak, medium width, \$300. Ward, 505-292-1618.

TREADMILL, Flexstride Healthtrider, \$400; Photosmart Express printer, \$50; AIWA CD stereo system, \$100. Sanchez, 505-414-1269.

WINTER TIRES, Michelin X-Ice, set of 4, 225/60 R17, used 3 CO winters, \$300 OBO. Ehrhart, 505-917-4830.

GOLF CLUBS, Ben Hogan Apex Edge Pro irons, 3-PW, stiff shafts, forged head, good condition, \$100 OBO. Magill, 607-821-9117.

INDOOR CYCLE, BH Fitness LK7001C, used 5 times, like new, 95-lbs., max user: 350-lbs., base 41" x 25", \$1,150 negotiable. Orndorff, 505-796-2082, ask for Renee.

DRILLPRESS, Craftsmen, \$70; large Yerf-Dog go-cart, engine needs work, \$300; both good condition & OBO. Vrooman, 505-249-8414.

ARMOIRE, 2 drawers, dark cherry finish, solid wood, American Home, excellent condition, \$100 OBO; Bose 3-2-1- sound system, w/remote, excellent condition, \$100 OBO. Ortega, 505-480-9600.

How to submit classified ads

DEADLINE: Friday noon before week of publication unless changed by holiday.

Submit by one of these methods:

- EMAIL: Michelle Fleming (classads@sandia.gov)
- FAX: 844-0645
- MAIL: MS 1468 (Dept. 3651)
- INTERNAL WEB: From Techweb search for 'NewsCenter', at the bottom of that page choose to submit an ad under, 'Submit an article'. If you have questions, call Michelle at 844-4902. Because of space constraints, ads will be printed on a first-come basis.



Ad rules

1. Limit 18 words, including last name and home phone (If you include a web or e-mail address, it will count as two or three words, depending on length of the address.)
2. Include organization and full name with the ad submission.
3. Submit ad in writing. No phone-ins.
4. Type or print ad legibly; use accepted abbreviations.
5. One ad per issue.
6. We will not run the same ad more than twice.
7. No "for rent" ads except for employees on temporary assignment.
8. No commercial ads.
9. For active Sandia members of the workforce, retired Sandians, and DOE employees.
10. Housing listed for sale is available without regard to race, creed, color, or national origin.
11. Work Wanted ads limited to student-aged children of employees.
12. We reserve the right not to publish any ad that may be considered offensive or in bad taste.

POWER WHEELCHAIR, Pride Mobility J6, 2Sp-Ss, brand new, never used, \$3,000 OBO. Fickling, 505-228-7869.

TRANSPORTATION

'06 HUMMER H3, adult driven, reliable, new BFG KO2 tires, tow pkg., 85K miles, excellent condition, \$15,000. Burr, 505-293-2588.

'99 FORD F150 XLT, 4-dr., step-side, 4WD, V8, 5.4 L, white, 106,300 miles, original owner, very good condition, \$6,000 OBO. Garcia, 554-4765.

'70 CAMARO SS, restored, 350 engine, AT, AC, keyless entry, Cowl induction, split bumper, call or text, \$25,000. Embry, 505-205-2618.

RECREATION

SCATTANTE CARBON FIBER FRAME, 60 cm, 20-spd., Shimano Ultegra components, very good condition, \$700. Patton, 505-379-3287.

'08 HONDA CRF-250X, 4-stroke, tires still have 80%, 7 extra oil filters, manuals, kick & electric (battery) start, always ridden mellow, excellent condition, \$2,200. Dwyer, 505-249-6935.

CROSS TERRAIN BIKE, lightly used, specialized Expedition Elite, armadillo tires, upgraded seat & brakes, quick shifters, more, \$475 new, asking \$200. Benson, 505-286-6245.

'16 VIKING TRAVEL TRAILER, 17FQ, sleeps 3, power tongue jack, light weight, like new, \$12,000 OBO. Shelland, 303-514-1448.

'00 FOREST RIVER MOTOR HOME, Class A, slide out, garage kept, 47K miles, excellent condition, \$20,000. Argo, 865-9305.

'08 YAMAHA VINO 50 SCOOTER, maroon, w/extras, 11K miles, \$800 OBO. Krok, 626-676-1052.

REAL ESTATE

VACANT LAND, Tome NM, near Tome Hill & UNM extension, \$40,000/acre, owner will negotiate price. Ramos, 304-593-3425 or 304-561-5612.

4-BDR. HOME, 2 baths, 2,700-sq. ft., updated interior, pool, .4 acre lot, cul-de-sac, incredible views, private yard, Four Hills. Wilfrid, 505-730-5232.

2-BDR. TOWNHOME, 2 large masters w/baths, 1,670-sq. ft., refrigerated air, new carpet/tile, MLS#895157, NE Heights, \$180,000. Brooks, 999-8552.

3-BDR. HOME, 2 baths, 1,798-sq. ft., single story, 2+car garage, spacious kitchen, Rio Rancho, great neighborhood/schools, MLS#893318, \$249,000. Soelberg, 801-710-9082.

4-BDR. HOME, 2 baths, 2-car garage, 1,600+-sq. ft., new windows/roof/appliances, grass w/sprinkler system, refrigerated air, Eubank/Candelaria, \$180,000. Arp, 505-239-9785.

3-BDR. HOME, 2-1/2 baths, 1,981-sq. ft., 11032 LaGrange Park, Towne Parke GC, owner-owned lot, MLS#895349, \$201,000. Stewart, 575-317-1876.

4-BDR. HOME, 2+-baths, 2+car garage, 3,350-sq. ft., fully remodeled, Wyoming & Academy area. Clary, 505-410-8293, ask for Christine.

WANTED

ROOMMATES, share 4-bdr. home, Volterra, includes utilities, \$500-\$600/mo. Herbert, 505-934-1110.

WASHER & DRYER, dryer must be electric, for apartment. Petraglia, 505-459-6195.

Center wins state award for performance excellence

By **Lindsey Kibler**

Safeguards & Security Center 4200 has been named a recipient of a 2016 Quality New Mexico Roadrunner Recognition award for its focus on long-term process improvement, sustainability, efficiency, and excellence. The award is part of the New Mexico Performance Excellence Awards program sponsored by Quality New Mexico, a nonprofit that helps New Mexico businesses and organizations improve performance.

To be considered, organizations like Center 4200 first had to prepare an organizational profile outlining its responsibilities and what its workers do.

"The self-assessment really required us to look at our processes and ensure we have a good foundation to make our decisions, which are very much data-driven decisions," says Richard Newman, Safeguards and Security (4230) senior manager.

The application packet required a self-assessment describing how the center's principles align with the seven principles of the Malcolm Baldrige Framework — leadership; strategic planning; customer and market focus; measurement, analysis, and knowledge management; human resource focus; process management; and results.

The center's previous Adobe Award, won in 2015 — the first year it applied — solidified a foundation and provided opportunities to "improve our processes and ensure we are delivering the services our customers need." Members of the center, as well as the center's quality partner from then-Center 700, whose goal is to drive operational excellence, prepared the 42-page outline, says Richard.

Multi-tiered system

The awards are given at four levels, beginning with the level one Adobe Recognition and followed by the Pinon and Roadrunner Recognition. The Zia Award is given once an organization meets all benchmarks outlined in the Malcolm Baldrige Framework.

Once an organization receives a Zia Award, it will be eligible for the Malcolm Baldrige National Quality Award. The Commerce Department manages the national award — the "nation's highest Presidential honor for sustainable excellence through visionary leadership, organizational alignment, systemic improvement, and innovation," according to the department's

National Institute of Standards and Technology.

Two-part application process

Following the application submission, representatives from Quality New Mexico made a site visit to observe the processes and interview members of the workforce performing the quality assurance positions outlined in the packet. The center received feedback from Quality New Mexico on how to enhance practices being used. Award recipients are announced the following year.

Strategic planning to drive quality

In 2015, the center held a strategic planning session that focused on driving quality. Following the session, the center collaborated with Quality New Mexico to look at the standard for excellence. "By working with them, we were able to bring in an outside entity to evaluate our program," Richard says. "A third party can give unbiased, constructive feedback and that is exactly what we received."

Through the partnership, Richard says the center learned that while its processes were good, they were

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— Richard Newman, senior manager
Safeguards and Security (4230)

not applied consistently. "Because of that, we were able to fill the gaps," he says.

One of those gaps was a lack of leadership succession planning within the center; there was not a formal program to address it. Taking that information, Richard says the center has now implemented a new leadership program that will look at high-performing individuals interested in management positions and aid in their career progression. The program will be piloted with the help of Human Resources and

Communications Div. 3000.

Richard says he is confident the center will win a coveted Zia Award, but will not be rushing to apply for it in 2017. Rather, it will use the feedback to reshape current processes. "Fine tuning processes is a process in itself and we owe it to our stakeholders, customers, and team members to ensure that the changes being made are working and that they are sustainable."

Seven additional Sandia organizations received Adobe awards:

- Accounts Payable (10513)
- Budget & Strategic Partnership Projects Financial Management (10519)
- CFO/Division Business Operations (10000)
- Indirect Financial Management (10518)
- Legal Prime Contract Division (11010)
- Contractor Assurance (9200)
- Treasury & Travel Services (10517)

QNM Awards has roots at Sandia

New Mexico's quality initiative started in September 1991 when Motorola Senior Executive Vice President Chris Galvin challenged New Mexico government, business, and education leaders to make New Mexico "The Quality State."

The next year, Galvin invited then-Gov. Bruce King, two senators, and more than 30 New Mexico business leaders to a seminar on quality in business. After the seminar, Charles Tapp had a vision that New Mexico should have a state award program to improve its economic competitiveness using the Malcolm Baldrige criteria.

In April 1993, Sandia appointed executive Julia Gabaldón to lead New Mexico's Quality Initiative. The awards program, established in 1994 as the New Mexico Quality Awards, was intended to be a measurement tool to determine progress and growth toward performance excellence. In 2012, New Mexico Gov. Susana Martinez showed her support of the program by signing Executive Order 2012-003 outlining the state's commitment to be "... a 'State of Excellence' with its businesses and organizations achieving role model and best in class performance status."



RUBEN RIVERO prepares one of the many dishes being served at the new Fresh Seasons Café.

Getting FRESH at Sandia

New food service provider Taher Inc. will emphasize fresh, local choices

By Myles Copeland
Photos by Randy Montoya

If it were just as easy to eat fresh food as fast food, would you choose fresh? The new food service provider at Sandia is counting on it.

Taher Inc., which became the Labs' food service provider in May and marked its Fresh Seasons Café grand opening with three days of events June 26-28, entered a marketplace crowded with fast food options. Within a mile and a half of its Thunderbird Café location in Sandia's Bldg. 861 there are two McDonald's, a Jack in the Box, a Chick-fil-A, a Domino's Pizza, Griff's Hamburgers, and Freddy's Frozen Custard.

With Taher touting that 70 percent of everything it serves is made from scratch, including fresh, never-frozen beef burgers and farm-fresh eggs, Lisa Teves (3334), a registered dietitian with Sandia's Employee



Health Services (EHS), says the new food service provider will make fresh, delicious, healthy food more accessible for Sandians.

"We want to make an environment where it's easy for people to make a healthy choice," she says. "If my environment supports me eating less processed food and more fresh food, I will."

Fast food is a staple for many adults in the US. In a 2013 Gallup poll, 47 percent of respondents said they eat fast food at least weekly.

Lisa sees a connection between fast food's popularity and its accessibility. If chicken nuggets are inexpensive, nearby, and easy to grab fast, people are more likely to eat them. These same factors apply when deciding to eat onsite. "People who go to Thunderbird feel it's convenient and a good deal for the money," she says.

As part of its Food4Life initiative, Taher will soon highlight a different meal each day offering whole, fresh foods for \$6.

"The Taher value meal has a different standard than the value meal with a soda and fries," Lisa says.

The \$6.85 vegan Garden Jambalaya was the most expensive item on Taher's menu June 26, with several items costing less than \$4, including the Supreme Pizza for \$3.25.

Taher aims to make onsite dining increasingly convenient. Currently operating the Fresh Seasons Café brand from the Area 4 and DOE cafés, in addition to the Thunderbird, the vendor also offers drop-off service to the Cyber Engineering Research Laboratory, Bldg. 823, and Area 5 and plans to add bicycle delivery service in the coming weeks. Pick-up and delivery orders can be placed at food.sandia.gov.

This wide availability on site allows for networking with coworkers while encouraging good dietary decisions, according to EHS Director Renee Holland (3300).

"It helps to build a culture of health, employee engagement, and productivity," Renee says.

Renee also sees the variety offered by Taher as potentially enticing to the Labs' growing population of millennials. Alongside stations labeled Salad Creation, Grill, Fresh Mex, Pizza, Vegan Street, and Freshwich, the Thun-



derbird Café features a World Station, which will serve a rotating selection of cuisines from around the globe.

"Because of the change in population we needed someone who would meet the tastes of millennials," Renee says. "With the millennials, we have more foodies and they want fresh, local, wholesome food."

Taher has promised to increase the amount of locally produced food it serves, while partnering with local companies and making continuous improvement toward Sandia's goals for sustainability.

Robert Kyzer, proprietor of Kyzer Farms in Albuquerque's South Valley, stood behind a tray of bratwurst during June 26's grand opening at the Thunderbird.

"Can you taste that buttery flavor?" asked Kyzer, whose father bought the family pork farm in 1971. "That comes from peanuts and sunflower that we add to the feed."

"I'm from the South Valley," said grand opening attendee Benita Montano (6354) after sampling the bratwurst. "The South Valley used to be farmed more than it is now. To see it being farmed for this, it gives me a happy feeling."

Kyzer was among the producers featured at a sampling table for La Montañita Coop, a community-owned natural foods market started in Albuquerque in 1976 with which Taher is developing a partnership.

Having committed to meet the Labs' Zero Waste by 2025 goal, Taher is moving away from the use of Styrofoam cups by selling reusable cups cobranded with Employee Health Services and Zero Waste logos.

"I have been pleased with the reception of the reusable cups," says Sam McCord (4736), a recycling planner with Sandia's lifecycle material management team. "The first batch we had, we sold out right away."

These multiple points of emphasis make Taher a good fit for Sandia's goals and culture, according to Renee.

"I think it just fits with the model of what we do: improve quality and service and be able to impact health," says Renee, who expressed her gratitude to members of EHS and Sandia's Facilities Division who worked to contract with Taher. "I see it as a good procurement."



A STIRRING DISH — Jerry Clah prepares fresh chicken salad in the kitchen at Sandia's Thunderbird Cafe. Jerry is a member of Taher Inc.'s Fresh Seasons Cafe team. Taher, which recently took over operation of the food service sites around the Sandia-DOE/New Mexico campus, says 70 percent of everything it serves is made from scratch.